

Chapter 7

Conclusion

7.1 General

From the consumers' point of view, the willingness to respond to the power sector reforms will be only if they have to pay less for the same or more consumption and the initial investment cost for availing the said reforms is recovered in a short span. Hence, under the structural reformation, the possible responses from the consumers are utilization of energy efficient appliances by taking advantage of government subsidy if available and availing open access if granted by the utility which is again under controlled regime. The concept of load shifting or reshuffling from the normal consumption pattern as a Demand Side Management measure is difficult to achieve under the existing structure without load study. Subsidy provision is burden on state government and tariff rise is burden on the non-subsidized group of consumers. Participation of non-subsidized consumers into energy market due to provision of Open Access creates cross-subsidy loss at Discom end. Hence, for the overall improvement in the performance of a Discom, tariff rationalization is required to be focused at. So, the objectives were set to

estimate the price elasticity to find flexibility of load shifts, analyzing effectiveness of Time-of-Use tariff structure, necessity of proposing Open Access to low end consumers and simultaneously giving financial gain to Discom in competitive market.

7.2 Major Findings

Based on the readily available consumption data and as per the objectives set for the study, certain findings from previous chapter are presented herein.

Chapter-2 presents the Price Elasticities for various consumer categories for all Discoms of Gujarat. Point elasticity based results are not enough for implementing Demand Response methods as the results do not present the hourly or time block based possibility of demand variation. Hence, it is concluded that there is a long waiting period for implementing the price based load management in Indian scenario.

Chapter-4 is for segregation of the feeders based on the load demand or consumption trends. Two clustering algorithms K-means and Self Organizing Maps based results have been portrayed which show that for the given data / area, the Self Organizing Maps algorithm works well. But for achieving the goal of consumption based consumer category formation, it is strongly felt that more detailed data i.e. micro level data covering all the categories of consumers is necessary where contribution of all the categories is comparable.

In **chapter-5**, the effect of Time-of-Use tariff is presented considering billing details of a High Tension continuous process industry consumer. Possibility of maximizing night rebate is evaluated using Evolutionary Programming algorithm when certain amount of load is shifted from peak hours to

night hours and/or off peak hours. The resulted billing rate is reduced compared to base case as well as the company gains considerable rebate on night consumption.

In **chapter-6**, Universal Charge (*UC*) based model is optimized for utility profit maximization using Sequential Quadratic Programming and Iterative technique. The results portray the model is acceptable in the given scenario as subsidy component is lowered down.

7.3 Scope for Future Research

The restrictions on Open Access regime, lack of infrastructure for Dynamic Pricing/Real Time Pricing, lack of availability of historical consumption data for load research are the major hurdles to evaluate the possibility of price based Demand Side Management measures in the existing scenario.

Hence, if the above said hurdles are removed, the future scope of the study can be highlighted as:

- When historical data of sub-category of consumers will be available at sub-transmission and distribution level, the price elasticity analysis can be extended and linkage with price dependent Demand Side Management can be further established.
- When Open Access restrictions are liberalized, system operational improvement can be analyzed as a case in future. This can be analyzed when frequency of deviation of Open Access consumers from scheduled demand and intensity of such deviation on system performance is made available.
- Clustering can be extended with Dynamic cluster formation algorithms

after availing data of every consumer category and can be extended for tariff reformation as a part of price based Demand Side Management.

- To encourage the Time-of-Use tariff structure to commercial entities having central air conditioning, a model can be developed to evaluate savings in average billing rate. For doing the same, load pattern needs to be formulated which shows majority of consumption at night hours to operate chillers and can be integrated in the existing study.
- To integrate variations of Universal Charge in Smart Distribution era, pilot study project can be implemented within certain areas where consumers are willing to accept dynamic pricing as a part of Demand Side Management and ready to shift the load as per the peak, off-peak or time block specific tariff pricing scenario offered.